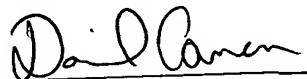


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ADJUSTABLE GATE BRACKET SYSTEM AND METHOD

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## ADJUSTABLE GATE BRACKET SYSTEM AND METHOD

The present invention relates to hardware for use in the construction of gates and, more specifically, to gate hardware adapted to brace the vertical and horizontal support members of a wooden gate and rotatably connect these members to a fixed structural member.

### BACKGROUND OF THE INVENTION

Gates are often used to allow selective access through a wall or fence. Conventionally, gates are constructed as follows. Two vertical support members and two horizontal support members are fastened together in a rectangular shape to form what will be referred to herein as a gate box. Fence boards or the like are fastened to the support members, and one of the vertical support members is rotatably attached by two or more hinge assemblies to a structural member such as a wall or post.

Using conventional gate building techniques, fasteners such as nails or screws are driven through one support member into another support member to form the corners of the gate box. Over time, the force of gravity and wood shrinkage will cause these fasteners to loosen, allowing the gate box to sag out of its desired rectangular shape.

Accordingly, metal L-brackets, wooden brace members, triangular pieces of plywood, and the like are often fastened to the adjacent ends of the support members to strengthen the inside corners of the gate box. In other situations, a wire is placed in tension between the upper proximal and lower distal corners of the gate box to support the lower distal corner of the gate box and thereby reduce sagging of the gate. Such bracing techniques are somewhat effective but also commonly employ fasteners that are susceptible to failure and can be relatively time consuming to implement.

Another problem with conventional gate building techniques is that fasteners such as nails or screws are similarly used to attach the hinge assemblies to the vertical support member adjacent to the structural member. The loads are transferred to the gate through the screws placed in tension. As the wood shrinks and the gate is opened and closed, the fasteners under tension tend to loosen and may eventually fail.

As the hinge fasteners loosen, the entire gate assembly may sag relative to the hinge assemblies and thus the structural member, even if the gate box maintains its rectangular shape. The use of braces at the corners of the gate box will worsen sagging at the hinges because the materials and hardware used for bracing increase the weight of the gate; this increased weight increases the forces of gravity on the fasteners used to attach the hinge assemblies to the proximal vertical support member.

The Applicant is aware of a product sold in Canada as early as approximately 1993 under the tradename "Artistic Steel Gate Frames". The Artistic Steel Gate Frame product comprises distal and proximal brace members, with hinges being attached to the proximal brace member. A gate assembly constructed using the Artistic product would use upper and lower horizontal wooden support members, but would not use vertical support members. Instead, the distal and proximal brace members would form the structure of the vertical sides of the gate. Accordingly, the brace members of the Artistic product were sold in a plurality of sizes, with each size corresponding to a given distance between the upper and lower horizontal support members.

One problem with the Artistic product is that this system requires the manufacturer to produce and keep in inventory, and the retailer to stock, multiple sizes of brace members. Furthermore, it has been noted that for packaging, transporting and merchandising that the above product is not well suited.

In addition, the end user is limited to one of these multiple sizes of brace members; one could not create a gate assembly having a custom distance between the upper and lower horizontal support members.

From the foregoing, it should be clear that one object of the present invention is to create bracket systems and methods that are strong, that are easy and inexpensive to use, and which allow significantly flexibility in the final design of the gate assembly.

### SUMMARY OF THE INVENTION

The present invention is a bracket system for forming gate assemblies. Four separate brace members are provided, and two of the brace members are rigidly attached to hinge assemblies. The brace members are adapted to be attached to different size support members to form the corners of a gate box functioning as the structural portion of the gate assembly. The hinge assemblies are adapted to be rigidly attached to a fence post to allow the gate assembly to pivot relative to the fence post. Gate assemblies of arbitrary height and width and using varying size of support members can be formed using the bracket system of the present invention. Furthermore, the design of the brace members makes packaging, transporting and merchandising well suited to the industry requirements.

It is therefore an object of the present invention to provide a bracket system for operatively connecting upper and lower horizontal support members and distal and proximal vertical support members to form a gate assembly adapted to be connected to a structural member, the bracket system comprising a first distal brace member comprising a fixedly positioned section and an adjustably positioned section defining a first support surface and a second support surface, where the first support surface extends substantially perpendicularly to the second support surface, the first support surface is adapted to be connected to

the distal vertical support member, and the second support surface is adapted to be connected to the distal vertical support member; and a second distal brace member comprising a fixedly positioned section and an adjustably positioned section defining a third support surface and a fourth support surface, where the third support surface extends substantially perpendicularly to the fourth support surface, the third support surface is adapted to be connected to the distal vertical support member; and a first brace assembly comprising a first proximal brace member comprising a fixedly positioned section and an adjustably positioned section defining a fifth support surface extends substantially perpendicularly to the sixth support surface, the fifth support surface is adapted to be connected to the upper horizontal support member, the sixth support surface is adapted to be connected to the proximal vertical support member, and the first hinge assembly is adapted to be connected to the structural member; and a second brace assembly comprising a second proximal brace member comprising a fixedly positioned section and an adjustably positioned section defining a seventh support surface and an eighth support surface and a second hinge assembly rigidly connected to the second proximal brace member, where the seventh support surface extends substantially perpendicularly to the eighth support surface, the seventh support surface is adapted to be connected to the lower horizontal member, the eighth support surface is adapted to be connected to the proximal vertical support member, and the second hinge assembly is adapted to be connected to the structural member; whereby the first distal brace member, the second distal brace member, the first proximal brace member, and the second proximal brace member are movable relative to each other; and spatial relationships among the first distal brace member, the second distal brace member, the first proximal brace member, and the second proximal brace member are fixed only when the gate assembly is formed.

It is a further object of the present invention to provide a method of forming a gate assembly to be connected to a structural member, the method comprising the steps of providing a first distal brace member comprising a fixedly positioned

section and an adjustably positioned section defining a first support surface and a second support surface, where the first support surface extends substantially perpendicularly to the second support surface; providing a second distal brace member comprising a fixedly positioned section and an adjustably positioned section defining a third support surface and a fourth support surface, where the third support surface extends substantially perpendicularly to the fourth support surface; providing a first brace assembly comprising a first proximal brace member comprising a fixedly positioned section and an adjustably positioned section defining a fifth support surface and a sixth support surface, where the fifth support surface extends substantially perpendicularly to the sixth support surface; providing a first hinge assembly adapted to be connected to the structural member; rigidly connecting the first hinge assembly to the adjustably positioned section of the first proximal brace member, providing a second brace assembly comprising a second proximal brace member comprising a fixedly positioned section and an adjustably positioned section defining a seventh support surface and an eighth support surface, where the seventh support surface extends substantially perpendicularly to the eighth support surface; providing a second hinge assembly adapted to be connected to the structural member; rigidly connecting the second hinge assembly to the adjustably positioned section of the second proximal brace member; slidably positioning the adjustably positioned section relative to the fixedly positioned section of the first and second distal brace members and of the first and second proximal brace members; and rigidly connecting horizontal and vertical support members to said first and second distal brace members and to said first and second brace assemblies.

It is yet a further object of the present invention to provide a bracket system for reinforcing a gate assembly, the bracket system comprising a first distal brace member having a fixedly positioned section and an adjustably positioned section comprising a first horizontal support portion defining a first support surface, a first vertical support portion defining a second support surface, and a first brace

portion arranged between the first horizontal support portion and the first vertical support portion, where the first support surface extends substantially perpendicularly to the second support surface, the first support surface lies in an upper horizontal support plane, and the second support surface lies in a distal vertical support plane; and a second distal brace member having a fixedly positioned section and an adjustably positioned section comprising a second horizontal support portion defining a third support surface, a second vertical support portion defining a fourth support surface, and a second brace portion arranged between the second horizontal support portion and the second vertical support portion, where the third support surface extends substantially perpendicularly to the fourth support surface, the third support surface lies in a lower horizontal support plane, and the fourth support surface lies in the distal vertical support plane; and a first brace assembly comprising a first proximal brace member having a fixedly positioned section and an adjustably positioned section comprising a third horizontal support portion defining a fifth support surface, a third vertical support portion defining a sixth support surface, and a third brace portion arranged between the third horizontal support portion and the third vertical support portion, and a first hinge assembly rigidly connected to the third horizontal support portion of the first proximal brace member, where the fifth support surface extends substantially perpendicularly to the sixth support surface, the fifth support surface lies in the upper horizontal support plane, the sixth support surface lies in a proximal vertical support plane, and the first hinge assembly is adapted to be connected to the structural member; and a second brace assembly comprising a second proximal brace member having a fixedly positioned section and an adjustably positioned section comprising a fourth horizontal support portion defining a seventh support surface, a fourth vertical support portion defining an eighth support surface, and a fourth brace portion arranged between the fourth vertical support portion, and a second hinge assembly rigidly connected to the fourth horizontal support portion of the second proximal brace member, where the seventh support surface extends substantially perpendicularly to the eighth support surface, the seventh support surface lies in

the lower horizontal support plane, the eighth support surface lies in the vertical support plane, and the second hinge assembly is adapted to be connected to the structural member; whereby the first distal brace member, the second distal brace member, the first proximal brace member, and the second proximal brace member are movable relative to each other; and spatial relationships among the first distal brace member, the second distal brace member, the first proximal brace member, and the second proximal brace member are fixed only when the gate assembly is formed.

It is still a further object of the present invention to provide a bracket system for operatively connecting upper and lower support members and distal and proximal support members to form a gate assembly adapted to be connected to a structural member, the bracket system comprising a first distal brace member comprising a fixedly positioned section and an adjustably positioned section defining a first support surface and a second support surface; and a second distal brace member comprising a fixedly positioned section and an adjustably positioned section defining a third support surface and a fourth support surface; and a first brace assembly comprising a first proximal brace member comprising a fixedly positioned section and an adjustably positioned section defining a fifth support surface and a sixth support surface and a first hinge assembly rigidly connected to the first proximal brace member, where the first hinge assembly is adapted to be connected to the structural member; and a second brace assembly comprising a second proximal brace member comprising a fixedly positioned section and an adjustably positioned section defining a seventh support surface and an eighth support surface and a second hinge assembly rigidly connected to the second proximal brace member, where the second hinge assembly is adapted to be connected to the structural member; whereby the first distal brace member, the second distal brace member, the first proximal brace member, and the second proximal brace member are movable relative to each other; and spatial relationships among the first distal brace member, the second distal brace



member, the first proximal brace member, and the second proximal brace member are fixed only when the gate assembly is formed.

5. The foregoing and other features of the present invention are more fully described with reference to the following drawings annexed hereto. Other objects, features and advantages of the present invention will be apparent from the description hereinafter.

#### BRIEF DESCRIPTION OF THE DRAWINGS

10 Fig. 1 is a perspective view of a gate frame system of the present invention comprising distal brace members and proximal brace assemblies;

Fig. 2 is an exploded, front elevation view of a gate assembly incorporating the gate frame system of Fig. 1;

Fig. 3 is a partial cut-away, front elevation view of the gate assembly of Fig. 2 attached to a fence post;

15 Fig. 4 is a front elevation view of the distal brace member depicted in Fig. 1;

Fig. 5 is a front elevation view of the proximal brace member depicted in Fig. 1;

Fig. 6 is a perspective view of the fixedly positioned section of the braces of the present invention;

20 Fig. 7 is a perspective view of the adjustably positioned section of the proximal brace assemblies depicted in Fig. 1; and

Fig. 8 is a perspective view of the adjustably positioned section of the distal brace members depicted in Fig. 1.

## DETAILED DESCRIPTION OF THE INVENTION

Referring initially to Fig. 1, depicted therein is a gate bracket system 20 constructed in accordance with, and embodying, the principles of the present invention. Referring for a moment to Figs. 2 and 3, the gate bracket system 20 is adapted to form a gate box 22 to be used as part of a gate assembly 24; the gate assembly 24 is in turn to be connected to a structural member such as a fence post 26 of a larger structure such as a fence 28.

The exemplary gate assembly 24 comprises in addition to the bracket system 20 distal and proximal vertical support members 30 and 32, upper and lower horizontal support members 34 and 36, and a plurality of fence members 40. The exemplary support members 30-36 are conventional wooden two-by-fours, but other materials and sizes may be used as the support members 30-36. The present invention will accommodate any type of lumber or timber as opposed to needing dressed and planed lumber milled to precise dimensions thereby providing for great flexibility in its use. The exemplary fence members 40 are also conventionally made out of wood, but other materials and various sizes of any type of material may be used to form the fence members 40.

The support members 30-36 and fence members 40 do not form a part of the present invention. A description of the construction and operation of these members 30-40 is not necessary to describe how to make and use the present invention and is included herein simply to illustrate the environment in which the present invention operates.

The fence post 26 is conventionally a wooden four-by-four, but other materials and sizes may be used to form the structural member to which the gate assembly 24 is rotatably attached. For example, rather than a fence post 26, the structural member may be a wall of a structure. The fence post 26 and fence 28 also are

or may be conventional and are not part of the present invention. As with the support and fence members 30-40 introduced above, a description of the construction and operation of the post 26 and fence 28 is not necessary to describe how to make and use the present invention. The fence post 26 and fence 28 are described herein simply to illustrate the environment in which the present invention operates.

The gate bracket system 20 of the present invention comprises first and second distal brace members 50 and 52 and first and second brace assemblies 54 and 56. The first brace assembly 54 in turn comprises a first proximal brace member 60 and a first hinge assembly 62, which the second brace assembly comprises a second proximal brace member 64 and a second hinge assembly 66.

Referring to Figs. 6, 7 and 8, the exemplary brace members 50, 52, 50 and 64 each comprise a horizontal portion 70, a vertical portion 72, and a brace portion 74. The brace members in turn are comprised of two main sections. The first section of the brace members will be defined generally as the fixedly positioned section 71. The second section of the brace members is defined generally as the adjustably positioned section of the distal (see Fig. 8) 140 member and as the adjustably positioned section of the proximal (see Fig. 7) 130 member or resulting assembly, the only difference residing in the presence of the hinge assembly on the proximal brace member for forming the brace assembly.

Adaptedly positioned along the length of horizontal portion 70 of section 71 and reciprocally along the length of the adjustably positioned sections 140 and 130, elongated openings 75, 131, 141 are provided. As illustrated, further opening 132, 142 are provided for matingly securing said sections 140 and 130 with section 71 thereby forming a distal brace member 50, 52 and a brace assembly 54, 56.

Once fixedly positioned section 71 and the adjustably positioned sections 140 and 130 are respectively put together, the resulting members 50, 52 and assemblies 54, 56 will be adapted to be slidably adjusted along a horizontal axis for use with different size support members. A stopping member 77 is provided in order to ensure that sections 140 and 130 do not over reach the length of horizontal portion 70 and possibly create some instability.

Referring to Figs. 4 and 5, an outer end 72a of the vertical portions 72 is rigidly connected to an attachment region 70a of the horizontal portions 70. The exemplary brace portion 74 is preferably rigidly connected at an angle between bracing regions 70b and 72b of the horizontal and vertical portions 70 and 72, respectively.

The choice of materials and shapes of the materials are not essential to any particular implementation of the present invention. The primary requirements of the brace members 50, 52, 60 and 64 are that these members each define a horizontal support surface 80 and a vertical support surface 82 such that these surfaces rigidly extend from each other at a right angle. In the exemplary system 20, the horizontal support surfaces 80 are adaptably positioned on the horizontal portions 70 and the vertical support surfaces 82 are formed on the vertical portions 72.

A plurality of fastener holes 90 are formed in the brace members 50, 52, 50 and 64; the fastener holes 90 are adapted to allow fasteners 92 to attach, in a conventional manner, the brace members 50, 52, 50, and 64 to the support members 30-36. The fasteners 92 are preferably self-tapping screws but can be nails, bolts, or the like. The fasteners 92 are not part of the gate bracket system 20 of the present invention per se but, as will be described in further detail below, are used to adjustably combine the bracket system 20 with the support members 30-36 to form the gate assembly 24.

The exact number and location of the fastener holes 90 is not critical to any given implementation of the present invention. In a broadest form of the bracket system 20, the fastener holes 90 can be formed anywhere along the horizontal portions 70 and vertical portions 72. The only requirement for the number and spacing of these holes is that the fasteners 92 extend through these holes 90 and into the support members to rigidly secure the brace members to the support members. It will be understood that the positioning of these holes along the horizontal portions 70 will be such to allow for slidable and adaptable positioning in light of the size of the support members used.

Given the foregoing general understanding of the present invention, the distal bracket members 50 and 52 and the proximal bracket assemblies 54 and 56 of the present invention will now be described in further detail.

The attachment and bracing regions 70a and 70b of the horizontal portions 70 of the exemplary bracket members 50, 52, 60 and 64 are formed located generally as follows.

The horizontal portions 70 have an outer end 70c and an inner end 70d. Once the adjustably positioned sections 140 and 130 are slidably put in place relative to fixedly positioned section 71 in light of the size of the support members 30-36 used the length of the spacing regions 70e is thereby determined such that the vertical support members 30 and 32 fit snugly between the vertical portions 72 and the other ends 70d. In the case of the proximal bracket assemblies 54 and 56, the length of the spacing regions 70e allows the vertical support members 30 and 32 to fit snugly between the vertical portions 72 of the third and fourth bracket members 60 and 64 and the first and second hinge assemblies 62 and 66, respectively. When, as is typical, two-by-four dimensional lumber is used to form the vertical support members, the length of the spacing regions 70e will be approximately 3 1/2", or slightly greater to allow for variations in the true dimensions of the lumber.

5 The exemplary horizontal and vertical portions 70 and 72 as well as adjustably positioned sections 140 and 130 are made of flat pieces of rigid metal, but other relatively rigid materials and shapes that function in a similar manner may be used. For ease of manufacturing, the exemplary horizontal and vertical portions 70 and 72 are identical in length. As for sections 140 and 130 they will by default be longer than horizontal portions 70.

10 The brace portion 74 is typically round or flat metal stock, but other shapes and materials may be used. For example, the brace portion 74 may be a triangular web of flat material that extends between the horizontal and vertical portions 70 and 72. In this case, the entire brace member may be cast of metal or injection molded from plastic.

15 From the foregoing, it should be clear that the exemplary brace members 50, 52, 60 and 64 are identical, which is preferred for manufacturing purposes. However, these brace members 50, 52, 60 and 64 need not be identical to practice the present invention in its broadest form.

The first and second hinge assemblies 54 and 56 are or may be conventional and will be described herein only to the extent necessary for a complete understanding of the present invention.

20 As is conventional, the hinge assemblies 54 and 56 each comprise a gate plate 120 and a post plate 122. These plates define hinge projections 124 that receive a hinge pin (not shown). The hinge pin allows the gate and post plates 120 and 122 to rotate relative to each other about a hinge axes C and D defined by the hinge assemblies 54 and 56.

25 The outer ends 70d of the adjustably portioned sections 130 of the first and second brace members 60 and 64 are rigidly connected to the gate plates 120.

An array of fastener holes 90 is formed in the post plate 122 to allow this plate to be rigidly attached to the fence post 26. Preferably four fastener holes 90 are formed in the post plate 122. The drawing depicts fastener holes 90 in the gate plate 120; these holes 90 in the plate 120 need not be used, but will be present if off-the-shelf hinge assemblies 62 and 66 are used.

The process of combining the bracket system 20 with the support members 30-36 to form the gate box 22 will now be described with reference to Fig. 2.

Initially, as is conventional, the support members 30-36 are cut to the desired lengths. The length of vertical support members 30 and 32 generally correspond to the height of the gate assembly 24, while the length of the horizontal support members 34 and 36 closely correspond to the width of the gate assembly 24.

Moreover, the present invention provides for the possibility of using different size support members, not only in its length, i.e. two by six instead of two by four inches for instance, whereby the adjustably positioned sections 130 and 140 are slidably positioned to securely accept different sizes. In practice, the support members 30-36 must be at least twice as long as the lengths of the sections 130 and 140 and vertical portions 72 to prevent overlapping of the adjacent brace members.

The first and second distal brace members 50 and 52 and first and second brace assemblies 54 and 56 are arranged such that: (a) horizontal and vertical support surfaces 80a and 82a of the first distal brace member 50 define first and second support surfaces of the bracket system 20; (b) horizontal and vertical support surfaces 80b and 82b of the second distal brace member 50 define third and fourth support surfaces of the bracket system 20; (c) horizontal and vertical support surfaces 80c and 82c of the first proximal brace member 60 define fifth and sixth support surfaces of the bracket system 20; and (d) horizontal and

vertical support surfaces 80d and 82d of the second proximal brace member 64 define seventh and eighth support surfaces of the bracket system 20.

5 Once the adjustably positioned sections 130 and 140 are slidably positioned to receive the size of the support members in use the fasteners 92 are inserted through the fastener holes 90 of the brace members 50, 52, 60 and 64 and into the support members 30-36 to form the gate box 22. In particular, fasteners 92 are driven through the holes 90 and into the support members 30-36 such that:

10 (a) the upper horizontal support member 34 is drawn tight against the first and fifth support surfaces defined by the first distal brace member 50 and first proximal brace member 60; (b) the lower horizontal support member 36 is drawn tight against the third and seventh support surfaces defined by the second distal brace member 52 and second proximal brace member 64; (c) the distal vertical support member 30 is drawn tight against the second and fourth support surfaces defined by the first and second distal brace members 50 and 52; and (d) the

15 proximal vertical support member 32 is drawn tight against the sixth and eighth support surfaces defined by the first and second proximal brace members 60 and 64.

The exact order of the attachments described in the preceding paragraph is not critical to the present invention in its broadest form.

The present invention results in a gate box 22 without any exposed parts of the members 50 and 52 or of the assemblies 54 and 56 showing on the exterior of the said box 22 except for the hinge projections 124. This not only results in increased appeal of the finished product but also in better and extended performance.

20 With the gate box 22 formed as described above, the hinge axes C and D will be substantially aligned. The gate box 22 so formed may thus then be attached to the fence post 26 by fasteners 92 extending through the fastener holes 90 in the



post plate 122 and into the post 26. When the post plates 122 are rigidly connected to the post 26, the gate box 22 pivots relative to the fence post 26 about the hinge axes C and D.

- 5 Given the foregoing, it should be clear that the present invention may be embodied in forms other than those depicted and described herein. The scope of the present invention should thus be determined by the claims appended hereto and not the preceding detailed description of the preferred embodiment.